

E³ 3² 7. (Amended) [The method of] A method according to claim 1, wherein the second metal layer filled in each of the second plurality of contacts holes has substantially equal depth [insulating layer has a nonuniform thickness and a portion thereof is etched to result in the plurality of second contact holes of substantially equal depth, whereby a plurality of filled contact holes of different overall depths results after filling the second contact holes with second metal layers].

I Please insert new claim 8 as follows:

E⁴ 4¹ 8. (New) A method according to claim 1, wherein the first and second metal layers are selective tungsten layers, respectively, and the first and second plurality of contact holes are filled with the first and second metal layers of the selected tungsten layers, respectively.

REMARKS

Applicant has reviewed and considered the Office Action and the cited references mailed September 12, 1995. In response thereto, the drawing (Fig. 2C) is amended; claims 3-6 are cancelled without prejudice or disclaimer; claims 1-2 and 7 are amended; and new claim 8 is added. As a result, claims 1-2 and 7-8 are pending in the present application.

The specification is objected to under 35 U.S.C. §112, first paragraph because the feature of "forming holes of substantially equal depth" is alleged not to be supported in the specification and drawings.

Applicant respectfully submits that Fig. 2D and the amended Fig. 2C provide support for this feature. As noted, in an

insulating layer disposition, an insulating layer has a substantially same thickness over the whole covering area underneath the insulating layer. In the other words, the first insulating layer has a substantially same thickness over the whole covering area underneath the first insulating layer, and the second insulating layer has a substantially same thickness over the whole covering area underneath the second insulating layer. Fig. 2C is amended to correct the confusion.

Accordingly, each of the first plurality of contact holes has substantially same depth, while each of the second plurality of contact holes has substantially same depth, so as to prevent the metal filling from being overgrown outside one of the contact hole, whereas another contact hole is not fully filled due to the difference surface topography in different contact holes (see "prior art" shown in Figs. 1A and 1B).

Applicant respectfully requests that the Examiner withdraw this objection and rejection of claims 1, 2, and 7 under the same reason.

Claims 1-7 are rejected under 35 U.S.C. §112, second paragraph. The claims 1 and 2 are amended to overcome this rejection. Claim 4 is cancelled. Applicant respectfully requests the Examiner to withdraw the rejection.

Claims 1-7 are rejected under 35 U.S.C. §103 as being unpatentable over the admitted prior art in view of Wolf.

Wolf article discloses the need for dielectric planarization to avoid the problems caused by severe topology roughness (as shown in Fig. 4-10 on page 201 and Fig. 4-11 on page 203). This point of view of Wolf's article is directed to the planarization of the insulating layer but not to the evenness of metal via

contacts having different depths. As stated on page 204 of Wolf's article (the second paragraph from the bottom), "As the degree of planarization is increased, such openings (referred to as vias when they are established in intermetal dielectric layers) will have different depths... Such a large variation can lead to insurmountable via-filling problems." (see page 204, the second paragraph from bottom). Continuing on, Wolf's article described, "If the technology for adequately covering vias with metal **requires** that the via sidewalls be sloped, an etch process for forming such sloped sidewalls will **have to be** used. However, if the vias have significantly different depths, it **may not be possible** to implement a sloped-sidewall etch process." (see page 204, the last paragraph to page 205, the first paragraph). Accordingly, even though Wolf's article indicates the difficulty in forming the via contacts having ^{same?} different heights, it does not provide any feasible suggestions or solutions for this problem.

On the other hand, one valuable aspect of the claimed invention is to make via contacts by using two separate steps in order to avoid the problems caused by the height differences of the via contacts as claimed in claim 1. Thus, Wolf's article in combination of the "prior art" disclosed in Figs. 1A and 1B does not disclose or teach the claimed invention.

Thus, Applicant respectfully submits that claim 1 patentably distinguishes over the admitted prior art in view of Wolf's article. Claims 2 and 7-8 which are dependent from claim 1 are also patentable.

In view of the above, Applicant respectfully submits that the present application is in a condition for allowance. Reconsideration of the present application and a favorable response are respectfully requested.

S/N 08/327,887

PATENT

If a telephone conference would be helpful in resolving any remaining issues, please contact the below signed at 612-336-4733.

Respectfully submitted,

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